Stage III. Head rounded quadrate, wide; vinous black, a broad mottled erect white band on the face of each lobe, divergent below; a white triangle in the clypeus; epistoma and bases of antennae white; width, 1 mm. Body robust, weakly annulate, colored as before; the dorsal and other white patches more mottled and cut by the ground color, which is darker, vinous blackish. Tubercles in the lateral patches lumpy white.

Stage IV. Head as before, black, epistoma white, white diffused dottings broadly over the angles of the lobes and slightly in the clypeus; rounded quadrate, as high as wide, antennae and mouth dark; width 1.4 mm. Body moderate, normal, uniform; vinous black, annulate; dotted white subdorsal line on joints 2–4, a cordate white mark, containing a dark dot in each lobe on joints 5–10, centered by tubercle i, the white cut by the annulet incisures, obscurely joined by a geminate dorsal band posteriorly; on joints 10–13 a waved broken subdorsal band, roughly imitating the cordate marks; a series of segmental white patches on joints 7–9, joined by a broad white band on joints 8–12, becoming a narrower band anteriorly and posteriorly, running narrowly onto the foot on joints 10 and 13. Venter obscurely white streaked, with a pale medio-ventral band, dark centered; small white dots laterally, especially at tubercles ii and iii. Orange blotches in the white lateral markings. With growth the markings fade and become yellowish, but leave a bright white lateral spot on joints 5, 6 and 7, largest on joint 7.

Stage V. Head rounded quadrate, thick, as high as joint 2, scarcely bilobed; dull black, with angular white dots over the sides and in clypeus, forming a short black-dotted band on the vertices of the lobes; epistoma white; width, 1.8 mm. Body robust, uniform, feet normal; leather brown (dead-leaf) dotted with black; a waved smoky black subdorsal line, the cordate white spots lost in the brown ground, leaving only a little white mottling about tubercle i, and whitish bars on the otherwise concolorous cervical shield and anal plate; faint linear white lateral line, black edged; large white spots about the spiracles on joints 5–10, faint posteriorly, involving tubercle iii by a lobe; an orange spot about tubercles iv and v. Venter with numerous indistinct lines of blackish and brown, subgranular, dotted by whitish. Thoracic feet dark; the abdominal ones of joint 10 white lined, of 13 large, marbled, with a whitish band anteriorly that joins a faint stigmatal band composed of the confluence of the stigmatal patches on joints 9–13; a reddish tinged stigmatal band on joints 2–4.

Stage VI. Head rounded quadrate, thick, the vertex roundedly divided, level with joint 2; colored as before but the white more extended, so that the ground color is white with crinkled and dotted dark brown marks, which are confluent over the sides and broadly each side of the median suture, and form a border within the

clypeus; eyes black, epistoma white, labrum brown, antennae white; setae short, brown, from small shining tubercles, normal; width, 2.4 mm. Body robust, cylindrical, uniform, tubercle i of joint 12 slightly enlarged, the thorax a little smaller, no humps. Coloration essentially as before; segments wrinkly annulate, smooth around the spiracles; carneous brown, olivaceous yellowish on the sides, shaded with blackish; thorax under lens pinkish white, dotted with brown-black, leaving subdorsal and stigmatal pale shaded bands, touched with ocherous; a square black patch laterally on joints 3 and 4; subventral region blackish shaded; feet dark brown. Abdomen dorsally (under lens) white, dotted thickly with ocherous and sparsely with black; a waved subdorsal black shade composed of dots and disappearing largely under a lens; sides olive shaded, a large white bilobed spot about tubercle iii and the spiracle, another on tubercle v and an ocherous one on tubercle iv, distinct on joint 6, fainter on joints 5 and 7, lost in a lilacine shade on joint 8 and running into a band on joints 9–13. Venter dotted, showing broad pale medio-ventral band, narrower dark one each side, narrow pale one, to a broader dark one over tubercles vi–vii, all rather evanescent under a lens; a straight subdorsal shade on joints 10–13, broken into oblique shades of dots; tubercle i of joint 12 white; anal shield and leg plates darkly marked on a white ground. Tubercles small, black; setae short, stiff, brown.

The larva spun a slight cocoon between leaves and pupated at once; adult issued in about four weeks.

Food plant, dandelion. The larvae were offered a variety of plants and chose this one. Probably they will eat a number of low plants. Larvae from Washington, D. C.

A LARGE number of European and American entomologists attended the summer meeting of the Entomological Society of America, held on August 22 in connection with the Seventh International Zoological Congress in Boston. The auditorium of the Boston Society of Natural History was well filled, and several very interesting papers were presented. Dr. Henry Skinner of Philadelphia presided. After the meeting the Cambridge Entomological Club entertained its guests at a smoker in the Grundmann Studios on Clarendon Street.

A REVIEW OF THE SPECIES OF THE GENUS BOMBYLIUS OF THE EASTERN UNITED STATES.

BY CHARLES W. JOHNSON, BOSTON, MASS.

SINCE making a study of the types of *Bombylius lucifer* O. S., in the Museum of Comparative Zoology, together with a comparison of the description of *B. mexicanus* Wied. and *philadelphicus* Macq., I find that there is a mistaken identification of two of our eastern species, and that the specimens referred to *B. lucifer* and *philadelphicus* in the New Jersey List, represent two undescribed species, while another undescribed form has been confounded with *fulvibasis* Macq. (= *atriceps* Loew).

Considering the apparently short duration of life of the adults of such readily recognized species as *B. major, pygmaeus, pulchellus* and *varius*, the time of appearance undoubtedly constitutes an important factor in determining closely related species. This feature requires a more careful study than I am now able to give, and while I have a large and carefully collected series, their relationship and time of appearance was not understood at the time they were collected. Owing to the fact that they are so easily denuded, specimens should be collected with the greatest care for denuded specimens are neither beautiful nor useful. Their life histories would also prove an interesting line of study. As far as known they are parasitic upon bees, chiefly *Andrena* and *Colletes*.

From the latitude of Philadelphia northward to Massachusetts the species can be divided provisionally into two groups:— those appearing in the spring, and those which appear in the summer; *B. major, pygmaeus, pulchellus* and *fulvibasis* representing the spring forms, and *B. mexicanus, incanus, fraudulentus, varius* and *subvarius* those of the summer. For *B. validus* I have no date of capture.

TABLE OF SPECIES.

1. Wings with the anterior half brown, which is sinuous and sharply defined posteriorly . . . . . *major* L.
   Wings with the basal portion brown and spotted with brown posteriorly . 2
   Wings with the basal portion brown, which is gradually evanescent posteriorly 3
2. Wings with the spots more or less coalescent and forming three quite distinct oblique cross-bands . . . . . *pulchellus* Loew.
   Wings with six or seven spots on the hyaline portion . . *pygmaeus* Fab.

3. Pile grayish white . . . . . *incanus* n. sp.
   Pile yellowish 4
   Pile yellowish, the black hairs predominating on the abdomen . . . 5
4. Wings with the posterior portion strongly tinged with brown . . . 6
   Wings with the posterior portion grayish hyaline 7
5. Sternum with black pile, large species, 12 mm. . . . . *varius* Fab.
   Sternum with white pile, small species, 6–8 mm. . . . *subvarius* n. sp.
6. Proboscis nearly as long as the body, large species, 12 mm. . *validus* Loew.
   Proboscis only one-half the length of the body, small species, 5–8 mm. *fraudulentus* n. sp.
7. Third joint of the antennae long and narrowly lanceolate, large species, 10–12 mm. . . . . *mexicanus* Wied.
   Third joint of the antennae more broadly lanceolate, small species, 6–8 mm. *fulvibasis* Macq.

Bombylius major Linn.

This is the most common and widely distributed of any of the species. It is found from the Gulf of Mexico to Canada, from the Atlantic to the Pacific, and throughout Europe and Northern Asia to Japan. In Louisiana it makes its appearance in March, in Colorado in April. In the vicinity of Philadelphia it is found from April 9, to May 19, depending on the season. Waltham and Wellesley, Mass., May 6 to 9.

Bombylius pygmaeus Fabricius.

This species as a rule seems to be more northern in its distribution, although recorded from Virginia. I have not been able to obtain the species south of New Jersey, Jamesburg, May 4, and Passaic Co. May 14. In Massachusetts the species seems to be quite common at Auburndale (Riverside) May 7, and Waltham, May 30. It has also been taken by Mrs. A. T. Slosson at Franconia, N. H., and by Mr. G. Chagnon at Montreal.

Bombylius pulchellus Loew.

A beautiful little species very common in the vicinity of Philadelphia, from April 29 to May 21, according to the season, but only remaining about a fortnight during any one year. I have a specimen from New York, collected by Mrs. Slosson, and have received specimens from Prof. C. H. Fernald, collected at Amherst, Mass., May 17 and 19.

Bombylius fulvibasis Macquart.

B. fulvibasis Macq. Dipt. Exot. V, 82, 1855.

B. atriceps Loew, Cent. IV, 49, 1863.

There seems to be no doubt that Macquart's name will have to be adopted for this species — "Long. 2¾, l. ♀. Trompe longue de deux lignes. Barbe blanche. Face d'un noir luisant. Front: le tiers antérieur d'un noir mat, à léger duvet fauve; les deux tiers postérieurs d'un noir luisant, à poils noirs." The size can only apply to this species and not to the specimen of "*philadelphicus*" which Baron Osten Sacken found with it — see O. S. Cat'l., note 159, p. 238.

This species which often closely resembles the following, is distinguished by its smaller size (6 to 8 mm.), duller yellow pile, with slight bands of black hairs on the abdomen, and the shorter and broader third antennal joint. Although widely distributed it seems to be quite local. I have only taken it at Clementon, N. J., where it can be obtained in great numbers on the flowers of the Sand Myrtle (*Leiophyllum buxifolium* Ell.), May 9–16. It has been collected by Mr. B. H. Walden at New Haven, Conn., May 25, by Dr. Geo. Dimmock, at Springfield, Mass., May 22 and by Mrs. Slosson at Charlotte Harbor, Fla.

Bombylius mexicanus Wiedemann.

B. philadelphicus Macq., Dipt. Exot. II, 1, p. 99, pl. VI, f. 3.

This is a larger species (10 to 11 mm.) than *fulvibasis*, with brighter and thicker yellow pile, black hairs rarely present, and a narrow lanceolate third antennal joint. It is usually found in the greatest number, about three weeks later than *fulvibasis*. It is represented in my collection by a specimen from Florida collected by Mrs. Slosson; Tifton, Ga., May 16 (G. R. Pilate); Ft. Washington, Md., May 26; Clementon, N. J., May 30; Riverton, N. J., June 9–16; Iona, N. J., June 8 (E. Daecke).

Bombylius incanus, n. sp.

B. philadelphicus Johnson, in Smith's Cat'l. N. J. Insects, p. 649 (not of Macquart).

♂. Face and front covered with dense silvery white hair, vertical triangle black, with black hairs, antennae black, the third joint narrowly lanceolate, proboscis about 3 mm. in length. Thorax grayish black, with white pile, the pile on the dorsum and scutellum less abundant and interspersed with black. Abdomen covered with long dense white pile, with a slight tuft of black hairs on the sides. A specimen

from Provincetown, Mass., has two tufts on each side, the anterior one being more prominent and giving the appearance of a transverse band, although no black hairs are present on the dorsal portion. Legs yellow, coxae, bases of the femora, knees and tips of the tarsi dark brown. Wings with the anterior basal third, dark brown, varying somewhat in extent and intensity. The specimens from Groton, Mass., are noticeably darker near the veins, the posterior portion of the wing hyaline, with a slight grayish tinge. Length, 5–7 mm.

♀. Front grayish above the antennae, and with short silvery white hairs, upper part and vertex grayish pollinose with black hairs. The abdomen has two distinct bands of black hairs, the hairs procumbent, the brown area of the wings less profused and hardly extending beyond the middle of the first basal cell, in other respects resembling the ♂.

The records for this species are at present confined to two states. In New Jersey it was first taken by the writer at Jamesburg, July 4, 1893, on May 30, 1897, a single specimen was collected at Clementon, and on June 13 of the same year a number were taken at Atco. Since then (June 8, 1902) it has been collected by Mr. E. Daecke at Iona and by Dr. P. P. Calvert, at Albion, June 1. The first specimens from Massachusetts to come under my observation were two, badly rubbed, from West Chop, Martha's Vineyard, collected by Mr. Albert P. Morse July 4, 1893. On June 24–27, 1904, I collected a number of specimens at Provincetown, and at Groton, July 8, 1905. There is a rubbed specimen in the Loew collection of this species marked "sp. nova inad."

This interesting species I have always found under similar conditions, *i. e.*, hovering over or alighting on the gray white sand of an old roadway, the color of the sand and fly being very similar. It resembles *B. metopium* O. S. from California, but lacks the brown strip of hairs extending from the shoulders to the base of the wings and also the black femora of that species. Types (♂ ♀) from Provincetown are in the New England collection of the Boston Society of Natural History.

Bombylius subvarius n. sp.

B. lancifer Johnson. In Smith's Cat'l. N. J. Ins. p. 649, 1890 (not of Osten Sacken).

♂. Face reddish brown, shining, sparsely covered with long black hairs; frontal triangle covered with a brownish pollen and bearing long black hair; inferior orbits and cheeks white, with long silvery, white hairs; antennae brownish black, the third joint very narrowly lanceolate; proboscis 6 mm. in length. Thorax black, opaque, covered with a long erect dull yellowish pile, which is mixed with black on